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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/590,366

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EXAMINER

CLARK, GREGORY D

ART UNIT

PAPER NUMBER

1794

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/590,366	Applicant(s) SUWA ET AL.	
	Examiner GREGORY CLARK	Art Unit 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. **Claims 1-5, 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (JP 2003-287883).**
2. **Regarding Claim 1**, Ito discloses a positive photosensitive resin composition composed of:
 - a. An alkali-developable resin (polymer with an alkali-soluble group) (10-500 parts by weight, paragraph 28) (corresponding to the 100 parts by weight for component A claimed by applicant)
 - b. a photosensitive compound (absorb light when exposed to light) (1-60 parts by weight, paragraph 29) (corresponding to the 1-30 parts by weight for component B claimed by applicant)

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- c. (abstract), a quinine diazide (paragraph 29) (5-100 parts by weight, paragraph 30) (corresponding to 1-50 parts by weight for component C claimed by applicant).
- d. inorganic particle (abstract) (5-20 parts by weight, paragraph 18) (0.005-2.0 microns = 5-2000 nm, paragraph 19) (corresponding to 5-500 parts by weight for component D claimed by applicant).

Ito also discloses that the inorganic particle includes titanium compounds (paragraph 14). The applicant claims a particle size of 1-30nm.

The ranges for components A-D disclosed by Ito are not exactly the same as the applicant; however, there is overlap in each case. In the course of optimizing the performance of the photosensitive resin composition, it would have been obvious to a person of ordinary skill in the art at the time of the invention to adjusted parts by weight of components A-D which would have included the overlapping portion of the ranges.

3. **Regarding Claims 2 and 3**, Ito discloses a positive photosensitive resin composition as discussed above. Ito also discloses that the composition absorbs ultraviolet light, i line 365nm (paragraph 68, section 3).

4. **Regarding Claim 4**, Ito discloses a positive photosensitive resin where the polymer with an alkali-soluble group can be a novolac resin (paragraph 10).

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5. **Regarding Claim 5**, Ito discloses a positive photosensitive resin where the polymer with an alkali-soluble group that can be an acrylate (free radical polymerizable) copolymer which contains carboxyl group or an epoxy group (paragraph 23).
6. **Regarding Claim 10**, Ito discloses a positive photosensitive resin that can include a tetrahydroxybenzophenone (paragraph 43).
7. **Regarding Claim 12**, Ito discloses that the photosensitive resin is exposed to ultraviolet rays and heat to form a pattern (paragraph 69).
8. **Regarding Claim 11**, Ito discloses a positive photosensitive resin composition that contains hydroxybenzophenone derivatives which give a transmittance of 400-500nm (paragraph 30). The applicant claims 365 to 465nm is in the range of 20-70% per 1.2 microns

The applicant mentions in the specification paragraphs 57 and 58 that with respect to a transmittance measured per 1.2 microns of thickness and a wavelength of 365-465nm to ensure a transmittance of not less than 20% (to avoid a large decrease in sensitivity during the patterning process) and a transmittance of not more than 70% (to avoid a taper angle leading to a pattern shape which exceed 65°) hydroxybenzophenone derivatives are selected that meet these characteristics.

As Ito clearly discloses the use of hydroxybenzophenone derivatives and the applicant indicates that such materials meet the above requirements, the above characteristics are deemed to be inherent properties of hydroxybenzophenone derivatives.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from known hydroxybenzophenone derivatives as disclosed by Ito that transmits in the overlapping region (400-465 nm) or in the region from 365-400nm by selecting the appropriate hydroxybenzophenone derivative which transmits at a lower wavelength.

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (JP 2003-287883) in view of Johnson (US 5,442,482).

10. Regarding Claim 13, Ito discloses that the photosensitive resin is exposed to ultraviolet rays and heat to form a pattern (paragraph 69), acid resistant (paragraph 40) and, a transmittance of 400-500nm (paragraph 30). Ito also discloses the photosensitive resin can form a pattern with high dimensional accuracy (paragraph 1) and a dot pattern of 10 to 1000 microns (paragraph 51). The applicant claims a dot dimension of 1-10 microns and a transmission of 400nm.

The dimensions of the dot size and the light transmission differ between Ito and the applicant. The use of relief dot pattern is well known in the art.

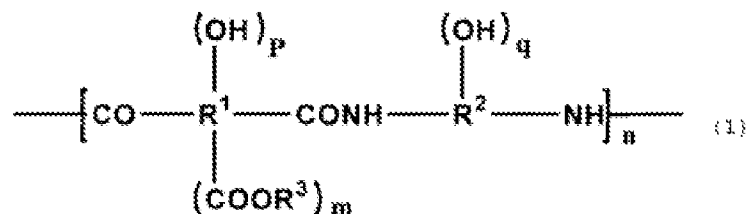
The applicant mentions in specification that one use for relief pattern dots is in the formation of microlens (abstract).

Johnson discloses the use of photosensitive resins to form a pattern of pots to form a microlens (column 6, lines 40-46).

Whereas Ito a pattern with high dimensional accuracy (paragraph 1) and a pot pattern of 10 to 1000 microns (paragraph 51) that covers the range claimed by the applicant and the a practical use mentioned by the applicant was known at the time of the invention, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have formed relief pattern dots of a desired dimension and select the appropriate hydroxybenzophenone derivative with a suitable transmission at 400nm or 80% or more per micron.

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (JP 2003-287883) in view of Hagiwara (US 6,197,475).

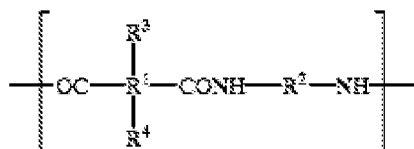
12. Regarding Claim 6, the applicant claims that the polymer with an alkali-soluble group (component A) is represented by generic formula 1:



In the formula, R^1 denotes a bivalent to octavalent organic group with two or more carbon atoms, R^2 a bivalent to hexavalent organic group with two or more carbon atoms, and R^3 a hydrogen atom or an organic group with 1-20 carbon atoms. And, n indicates an integer in the range of 10 to 100000, m an integer in the range of 0 to 2, and p and q an integer in the range of 0 to 4 that meet the following equation: $p+q \geq 0$.

Ito discloses a photosensitive resin composition composed of an alkali-developable resin (polymer with an alkali-soluble group) (component A) (paragraph 28). Ito fails to mention discloses a photosensitive resin composition composed of an alkali-developable resin represented by applicants' formula 1.

Hagiwara discloses a photosensitive resin containing an alkali-soluble group represented by generic formula 2:



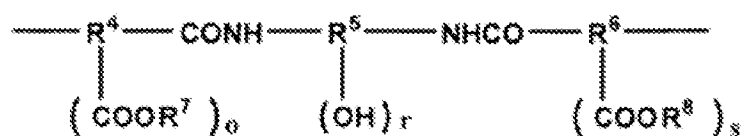
wherein R^1 represents a tetravalent group may have one or more substituents, R^2 represents a divalent group which may have one or more substituents; R^3 and R^4 are in the ortho-position of one of two carbonyl groups, respectively, and each independently represent a hydrogen atom or a carboxyl group, provided that at least one of which is a carboxyl group, is more preferred.

Formula 2 shows R is tetravalent and can be substituted with a carboxyl group and R₂ is divalent.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from known alkali-developable resins such as generic formula 2 disclosed by Hagiwara which is used in the same fashion as Ito and reads on applicants' formula 1, absent unexpected results.

13. **Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (JP 2003-287883) in view of Hatanaka (US 2004/0048188).**

14. **Regarding Claim 7,** the applicant claims that the polymer with an alkali-soluble group (component A) where formula 1 is represented by formula 3:



R⁴ and R⁶ represent a bivalent to quadrivalent organic group with 2-20 carbon atoms, R⁵ a trivalent to hexavalent organic group with a hydroxyl group and 3-20 carbon atoms, and R⁷ and R⁸ either a hydrogen or an organic group with 1-20 carbon atoms. In addition, o and s denote an integer in the range of 0 to 2, and r shows an integer in the range of 1 to 4.

Ito discloses a positive photosensitive resin composition composed of an alkali-developable resin (polymer with an alkali-soluble group) (component A) (paragraph

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28). Ito fails to mention discloses a positive photosensitive resin composition composed of an alkali-developable resin represented by applicants' formula 3.

Hatanaka discloses to form photosensitive resin (abstract) polyamic acid it is common to react or polymerize a diamine with a tetracarboxylic dianhydride (R4 and R6, quadrivalent organic groups) (paragraph 19). Hatanaka also mention diamines that have a phenolic hydroxyl group (paragraph 33) such as 2,2-bis(4-amino-3-hydroxyphenyl)hexafluoropropane (R5, trivalent having an hydroxyl group) (paragraph 34).

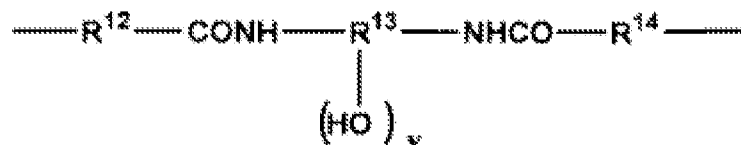
The approach disclosed above by Hatanaka polymerizing a diamine (containing an hydroxyl group) with a tetracarboxylic dianhydride would result in a polyamic acid derivative that reads on applicants' formula 3.

With a reasonable expectation of success, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected form known photo-sensitive polyamic acid derivatives such as those disclosed by Hatanaka which reads on applicants' formula 3, absent unexpected results.

15. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (JP 2003-287883) in view of Mitsufumi (JP 2003-075997).

16. Regarding Claim 8, the applicant claims that the polymer with an alkali-soluble group (component A) is represented by formula 4:

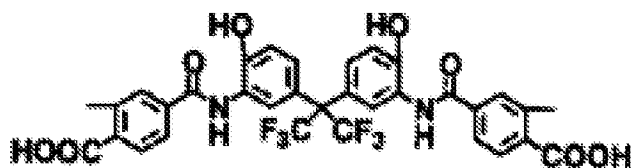
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Whereas R¹² and R¹⁴ is a divalent organic group 2-20 carbon atoms and R¹³ trivalent to hexavalent organic group.

Ito fails to mention discloses a positive photosensitive resin composition composed of an alkali-developable resin represented by applicants' formula 4.

Mitsufumi discloses a photosensitive resin which includes an alkali-developable resin (polymer with an alkali-soluble group) represented by formula 5 (paragraph 20):



Formula 5 disclosed by Mitsufumi represents an alkali-developable resin where R¹² and R¹⁴ are divalent, R¹³ is tetravalent and v = 2 (OH).

With a reasonable expectation of success, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from known alkali-developable resins such as formula 4 disclosed by Mitsufumi which is used in the same fashion as Ito and reads on applicants' formula 1, absent unexpected results.

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17. **Regarding Claim 9**, Ito discloses a positive photosensitive resin which includes a quinine diazide (paragraph 29) . Ito fails to mention the absorption of a specific diazide.

Mitsufumi discloses a photosensitive resin that includes a quinone diazide compound which is a sulfonic acid ester of a naphthoquinonediazide combined with a phenolic hydroxyl group (paragraph 43) with absorption at 400-800 nm (paragraph 30). The applicant claims 400-700 nm.

In paragraph 61 of the applicants' specification there is disclosed a quinone diazide compound consisting of a phenolic hydroxyl group connected with naphthoquinone diazide sulfonic acid through an ester.

With a reasonable expectation of success a person of ordinary skill in the art at the time of the invention would have selected from known quinone diazide compounds which would have included those disclosed by Mitsufumi which read on the instant claim limitations.

The examiner takes the position that the thermal stability of the a quinone diazide compound is an inherent property. Given that the applicant and prior art use the diazide compound in the same manner the thermal stability would be expected to be the same.

18. **Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (JP 2003-287883) in view of Hayashi (US 563957).**

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19. **Regarding Claims 14 and 15**, Ito discloses that the photosensitive resin is exposed to ultraviolet rays and heat to form a pattern (paragraph 69), acid resistant (paragraph 40). Ito fails to mention a solid state image sensor produced from the pattern.

Hayashi discloses a solid state image sensor can be made from a photosensitive resin (abstract).

With a reasonable expectation of success, it would have been obvious to a person of ordinary skill in the art at the time of the invention to produce a solid state sensor from the photosensitive resin of Ito since Hayashi discloses such a process is common in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY CLARK whose telephone number is (571)270-7087. The examiner can normally be reached on M-Th 7:00 AM to 5 PM Alternating Fri 7:30 AM to 4 PM and Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1794

GREGORY CLARK/GDC/
Examiner
Art Unit 1794